period free from rain, approaches in respect to its depth the normal, when the existing pollution is the normal pollution. Bacteriological examinations at high water, or at low water, at the time of beginning rise, or at the time of local rains without rise, may lead to gross errors, and are, in consequence, worthless for the estimation of the normal pollution. At points where considerable pollution by organic matter is observed, the number of organisms is largely dependent on the temperature, which, however, has no marked influence where their number is small. With rising water, the differences in the pollution at single points, which stand out sharply in comparison with the normal pollution, may to a greater or less extent disappear, and thus the influence of polluted influents and of the self-purification of a river may be more or less hidden.

[From a practical sanitary standpoint, the nature of the occasional and constant polluting influents is of much greater importance than the amount, especially when, as is often the case, two or more polluting influents of widely different character may, by their mutual action on each other, bring about extensive chemical as well as bacteriological purification.]

Influence of Pollution, Temperature, and Ventilation on the Hardness of Ground Water.—DR. GUSTAV VON RIGLER (*Archiv für Hygiene*, xxx. 69), in determining the influence of these factors, used clean sand as a soil and urine mixtures of varying percentage-composition as a polluting agent, and obtained some striking results. The amounts of lime and magnesia in the urine mixtures were determined in each case before the latter were employed. The first series of tests made with distilled water demonstrated that less and less lime and magnesia are washed out of the soil as the exposure continues. Next, using water containing 1 per cent of urine, and, therefore, insignificant amounts of lime and magnesia, it was shown that the hardness of the effluent was increased gradually from ten to forty-eight degrees. Employing 10 per cent. of urine the hardness rose more rapidly from eleven to two hundred and sixty-nine degrees. Adding, from day to day, to the same specimen of sand, mixtures of urine containing first 1 per cent., then 2½, 5, 7, and 10 per cent., it was found that the hardness rose gradually, and then fell, the highest degree attained being with 5 per cent. Thus, excessive pollution reduces the power of the water to withdraw lime and magnesia.

Experiments on the influence of temperature proved that the hardness rises and falls respectively with increased and diminished heat.

Investigating the effect of aëration, he showed that from a soil extensively polluted but well aired, the effluent water rapidly gains, then gradually diminishes in hardness; but that when it is not well aired, the hardness increases slowly but constantly. With extensive pollution and no aëration, the hardness increases gradually for a time, and then gradually falls.

The degree of pollution, the temperature, and the amount of air present exert individually and collectively a great influence on the decomposition processes in the soil, particularly the formation of carbon dioxide, nitric acid, etc., and hence on the solution of the constituents to which hardness is due.

Cause of Death of Fishes in Polluted Rivers.—DR. W. THÖRNER (*Forschungsbericht für Lebensmittel*, 1897, 172) has thrown considerable light on the cause of death of fishes in polluted streams by his investigation of a case where, in spite of the large extent of pollution present in a river, the water could not be regarded as abnormally foul, and yet large numbers of fish had died. The polluting matters were partly in solution and partly in suspension, and much in a condition for further oxidation. He noticed considerable amounts of ferric hydrate, and its presence suggested that the iron had entered the river in the ferrous form, and had then been oxidized at the expense of the dissolved oxygen of the water. The complete or very large withdrawal of this element by the process of oxidation would naturally render the water incapable of sustaining fish life. Analysis of two samples of the water showed in the one case 57.2 c.c. of total dissolved gases per litre, consisting of 60 per cent. of carbon dioxide and 40 of nitrogen, and in the other 67.2 c.c., consisting of 67.2 per cent. of carbon dioxide and 32.8 of nitrogen. Thus, in neither case was there any oxygen, and hence the death of the fish.

[This explains, in part at least, the disappearance of fish-life in many streams polluted by the sewage of manufacturing establishments, and why the same does not occur where sewage outlets enter the sea, where there is necessarily much aëration.]

Inoculations for Plague.—PROF. HAFFKINE'S report to the Bombay Standing Committee on the results of inoculation for plague gives an account of his work on the inmates of the jail at Byculla. Between January 23d and 29th nine cases occurred, five of which were fatal. At the beginning of the outbreak the population of the jail was 345. On January 30th, prophylactic treatment was applied to 154 inmates who volunteered to be inoculated. One person had a painful gland in the left groin and two others developed painful glands in the left axilla the same evening; the three cases proved fatal. On the following day two cases occurred among the inoculated, and both died. One of the inoculated persons was taken, but recovered. On the second, third, fifth, and sixth days cases occurred among those who had not been inoculated; all fatal. No cases occurred among those who had been inoculated from the first day until the seventh. On the seventh day there were five cases among the non-inoculated, one of which was fatal, and one occurred among the inoculated, but ended in recovery. From January 31st to February 6th twelve cases occurred among the non-inoculated, six of which were fatal, and but two cases among the inoculated, both of which recovered.

Haffkine concludes that the injection of 3 cubic centimetres of prophylactic seems to be sufficient to effect the desired protection. It cannot arrest symptoms already started or that show themselves within a few hours, but the time necessary for it to produce the protective effect is very short.

Transmission of Typhoid Fever through the Air.—The fact that many authorities regard infected air as a common, and, indeed, by some as the principal, medium of transmission of typhoid fever, led DR. EDUARDO GERMANO (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxiv. 403) to institute a series of experiments to determine whether or not this view can be supported by facts. The infected air theory is based on a large number of observations, the value of which must not be overrated, and Germano cites a number of outbreaks which have been attributed to air-infection. In his experiments he used various kinds of dust and dirt, and from the results obtained he concludes that, contrary to the commonly accepted opinion, the typhoid germ is unable to withstand complete drying, and hence cannot be transmitted to man through dust that is dry enough to be disseminated by air-currents. Infection through the air, especially over a distance of several hundred metres, as is assumed in one of the cases cited (Froidboise), must be regarded as wholly inconceivable. Experiment showed that the typhoid germ can live not only in moist surroundings for a long time, but, under certain circumstances, even in an apparently dry condition. This is possible when it adheres to or is encompassed by matters which themselves contain a certain amount of moisture, such, for instance, as clothing, linen, particles of dirt, and fecal filth. Most of the bacilli die as the drying process progresses, but certain ones are more or less resistant, though not necessarily dangerous on admission to the air, since then complete drying and consequent death occur. They are dangerous only in case of introduction into the system by direct or indirect contact, as from the fingers, food, or eating utensils.

Nevertheless, this very property of retaining vitality for a long time in a half-dry condition must be regarded as an important factor in typhoid infection.

Tubercle Bacilli in Butter.—PROF. O. ROTH (*Correspondenzblatt für Schweizer Aerzte*, September 15, 1897) contributes a second paper on the examination of butter for tubercle bacilli. The results of his examinations, reported in 1894, were based wholly on experiments with animals, which procedure requires the expenditure of a great deal of time. This fact led him to attempt the demonstration of the bacilli by cover-glass preparation, and after a number of trials of different methods he found one which commended itself. He employed a butter which he made from milk rich in tubercle bacilli which was derived from a cow with a tuberculous udder. With thorough or even superficial washing with water the bacilli of the butter could be detected in the wash-water, but a surer method was needed, and the following was devised: Two to four grammes of butter are introduced into a test-tube about three-fourths full of water, and kept at about 50° C. in a water-bath until the fat is completely melted, then shaken thoroughly to separate the bacilli from the fat, and inverted and allowed to cool until the fat is again solidified. The water is then poured out and centrifugalized, or allowed to stand for sedimentation in a conical glass or separating funnel. To prevent the increase of other bacteria a little formalin may be added. After centrifugalizing, or after twelve to twenty-four hours' standing, cover-glass preparations of the sediment are made. These are dried by gentle heat, treated with alcohol and ether for the removal of all traces of fat, and then stained. With his tuberculous butter, the bacilli were found in this manner in great numbers. Unfortunately, he could get no more milk in which the bacilli could be directly demonstrated by the microscope, and so could not further investigate the question whether they can be demonstrated in butter made from mixed milk containing only a small proportion of infected milk. Artificially infected milk is not suitable for the study of the question on account of the difficulty of securing uniform distribution of the bacilli.

Coming soon after the publication of Roth's article, is one by Dr. Lydia Rubinowitsch (*Zeitschrift für Hygiene und Infectionskrankheiten*, xxvi. 90), bearing directly on the question which Roth could not investigate. She reviews the conflicting evidence in the literature of the subject, and gives the results of her own work on eighty samples of shop-butter, thirty obtained in Berlin and fifty in Philadelphia. The tests were made with animals, using two for each sample. From the whole number of specimens examined not once did she detect any tubercle bacilli which, by culture or pathological behavior in animals, could be pronounced genuine. On the other hand, over a fourth of the samples (28.7 per cent.) produced in guinea-pigs changes which macroscopically and microscopically could deceive one into the belief that they were genuinely tuberculous, but which with more careful examination proved otherwise. Among the Berlin samples ten yielded what seemed to be tubercle bacilli; with one, both animals yielded this bacillus and showed the apparently characteristic changes; with two, one animal did the same and the other died of peritonitis; with three, one animal did the same, and the other yielded only the changes; and with four, one animal did the same, and the others showed no change. The remaining twenty Berlin samples gave the following results: With three, rapid death of both animals from peritonitis; with two, one animal normal, the other showed the resembling pathological changes, but no bacilli; with seven, one died and the other was normal; and with the other eight, both animals remained normal. The fifty Philadelphia samples yielded essentially similar results. In every case where the bacillus like that of tuberculosis was found, careful investigation showed that while it presented many close points of resemblance it was certainly not the same.

The majority of the animals which did not die of peritonitis were killed after from three weeks to over three months from the time of inoculation. A few which showed a considerable loss in weight at the end of the second week were killed and examined at that time.

[The very careful and painstaking work of Dr. Rubinowitsch throws a very decided doubt on the accuracy of the results of those writers who have during the past few years reported the presence of tubercle bacilli in all grades of market butter, and suggests that they had to deal with the same or another bacillus closely resmbling that of tuberculosis.]

Cause of Goitre.—Surgeon-Lieut. E. E. Waters (*British Medical Journal*, September 11, 1897) communicates some interesting facts concerning the causation of goitre in a district in India 2000 feet above sea-level, which point strongly to an organic rather than a mineral cause. The soil is extremely porous. The water contains no more than a moderate amount of organic matter and mineral constituents, is soft or moderately hard, and, except for minute traces, is free from iron.

The inhabitants, who live under the same climatic conditions, but with different occupations, may be divided into two classes: the native Bhutias and the Sepoy troops from the northwest provinces. The former are carriers and coolies; they are omnivorous, but by reason of poverty, mostly vegetarians. Their chief diseases are goitre, syphilis, and malaria. The temporary inhabitants, the Sepoys, are all vegetarians, and are a healthy lot, practically